

Testimony before the Subcommittee on Research and Science Education,  
House Committee on Science and Technology

***The Role of Community Colleges and Industry in Meeting the Demand for  
Skilled Production Workers and Technicians in the 21<sup>st</sup> Century Economy***

June 19, 2007

Eric Mittelstadt, CEO,  
National Council for Advanced Manufacturing (NACFAM)



## Abstract

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### ***The Role of Community Colleges and Industry in Meeting the Demand for Skilled Production Workers and Technicians in the 21<sup>st</sup> Century Economy***

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Manufacturing production workers and technicians require increasing skills because of the growing use of automation, information technology, statistical quality control, lean, just-in-time delivery, etc. This added sophistication of production jobs is magnified by the impending shrinking of the US workforce due to the retirement of millions of “baby boomers” over the next decade. Thus the current and near-future outlook for graduates of technical training programs is excellent, even as increasing productivity continues to reduce the number of traditional manufacturing jobs, similar to agriculture in the previous century. Faced with the current and growing shortage of qualified technicians, many companies, their associations, and educational institutions are all taking multiple and collaborative steps to attract more students to careers as the skilled technicians required in production work in the 21<sup>st</sup> century. They are also increasingly partnering with community colleges to guide their tech-prep programs to address the required skill upgrades. These upgrades include STEM education even for production workers to enable them to most effectively use the advanced equipment and production techniques so essential to US manufacturing competitiveness in the hyper-competitive global economy of today and the future.

## Executive Summary

### (Oral Presentation)

Chairman Baird, Ranking member Ehlers, and members of the Subcommittee, I am honored to testify today on what NACFAM believes is a critical issue in the 21<sup>st</sup> century, the need for a more highly skilled and a lifelong learning work force. I commend you for this hearing, and hope I can add to our collective understanding of the issues and what community colleges and industry are doing to meet the demand.

Let me briefly set the stage for why higher skill levels are required of production workers and technicians now and in the future, and why innovative and collaborative approaches to training for them are essential.

Manufacturing has led the US economy in productivity gains in recent years, but that productivity must continue to increase for a number of reasons. These include demographics, consumer demands, the “hyper-competitive” global economy, inevitable fluctuations in our own economy, and finally, because we have fewer people than China and India have for example, we must be more productive, and innovative, to remain a world power.

To achieve the dramatic increases in manufacturing productivity of the past 20 years or so has required increasing use of the technologies of automation, information technology, statistical quality control, lean, just-in-time delivery, etc. To utilize these technologies effectively, production workers continuously need more skills. This added sophistication of production jobs is magnified by the coming dramatic reduction in the size of the US workforce, as millions more “baby boomers” retire over the next decade than the number of new young workers entering that workforce.

Obviously this demographic fact of life affects all sectors, from stock brokers to teachers, from retail sales people to health care workers, and certainly affects manufacturing. Thus the current and near-future outlook for graduates of technical training programs is excellent, even as the reality of increasing productivity continues to reduce the number of traditional manufacturing jobs, similar to agriculture in the previous century. Data from a number of industries show shortages already of qualified workers, and this will only get worse as the demographics play out.

Faced with this reality, many companies, their associations, and educational institutions are all taking multiple and collaborative steps to attract more students to these careers. Companies must pay higher wages and benefits for these positions, increase their training efforts, utilize objective skill standards and certifications, and improve their retention policies.

Companies are also realizing that they cannot solve this problem by themselves. They are partnering with community colleges to guide tech-prep programs to address the required skill upgrades, and working through their associations to attract more students to

these skilled careers. For example, the *Business Champions* program of the NAM Manufacturing Institute's Center for Work Force Success encourages manufacturing executives "to engage the business community, elected officials, foundation leaders and state policymakers" about the importance of community colleges in developing a skilled workforce. Further, their *Dream It Do It* program works to raise the perception of manufacturing careers among current and potential students.

The necessary skills for even production workers now include STEM education to enable them to most effectively use the advanced equipment and techniques so essential to US manufacturing competitiveness. STEM skills are included for example in the Advanced Manufacturing Competency Model sponsored by the Department of Labor, in whose development we at NACFAM and other industry associations participated. They are also included in the Manufacturing Skill Standards Council (MSSC) work that NACFAM co-led with the American Federation of Labor's Working for America Institute.

In conclusion today, there is great progress being made, but the challenges are even greater. The required 21<sup>st</sup> century workforce skills are not only important to every individual; they are increasingly becoming central for continued American innovation and prosperity.

Moreover, as daunting as these workforce challenges are, they are only one of many facing US manufacturers. In the new paradigm of "*network-centric manufacturing*", a new level of "*intense collaboration*" is required among OEMs and suppliers, as well as with labor, education and government.

The future competitiveness of our nation depends upon the success of that "*intense collaboration*", including as it applies to the critical issues being discussed here today. NACFAM looks forward to working with you to make it happen!

Thank you very much.

## Written Statement

A key issue facing our great nation in the 21<sup>st</sup> century is the need for a more highly trained work force to maintain the US position as a world power. NACFAM commends the Subcommittee for this hearing, and hopes it can add to the collective understanding of the issues and what community colleges and industry are doing to meet the demand.

While today's focus is on production workers and technicians, many of the points herein apply to most sectors of the US economy. It is helpful to set the stage for why higher skill levels are required of these workers now and even more so in the future, and why innovative and collaborative approaches to training for them are essential.

Manufacturing has led the US economy in productivity gains in recent years. Overall the concerns of the 80's and into the 90's that Japan would surpass our productivity have been put to rest. Today however, there are new challenges from China and India especially, and in the remainder of this new century others will arise as other nations in Southeast Asia, Latin America, Africa and even the Middle East, seek to improve their economies and the standard of life of their citizens. Therefore, manufacturing productivity must continue to increase for a number of reasons:

- Demographics – tens of millions fewer workers (input) by 2018, but a growing population and increasing demand (output).
- Consumer pressures for higher quality, content and customization at ever lower prices.
- An increasingly “hyper-competitive” global economy as more and more nations seek to improve their economies to become more like America.
- The inevitable fluctuations in the economy -- when times are tough, companies must squeeze every penny they can out of costs just to survive.
- And finally, because the US has fewer people than China and India for example, we must be more productive, and innovative, for the America to remain a world power.

This need for increased productivity generates some inescapable trends:

- The need for increased productivity means producing more (output) with fewer workers (input).
- Thus, there will be an inevitable reduction in the number of traditional manufacturing jobs.
  - Similar to agriculture in the previous century, but hopefully not as severe, and also necessary because of the shrinking workforce.

- The experience lost by the retirement of the “baby boomers” along with the increasing use of technology on the factory floor requires well-trained workers and lifelong learning to keep those skills current.
  - Another way of looking at this is that the experience of the retirees will be replaced by the increased skills of younger workers because the latter can’t possibly enter the workforce with the experience of those retiring from it.
- All of this requires innovation in both product and process development & deployment, and also in labor-market policies by businesses as well as in the education and training practices of the institutions preparing workers for the future.

Achieving the dramatic increases in manufacturing productivity over the past 20 years or so has required increasing use of the technologies of automation, information technology, statistical quality control, lean, just-in-time delivery, etc. To utilize these technologies effectively means manufacturing production jobs require more skills, including STEM capabilities even on the factory floor. This added sophistication of production jobs is magnified by the coming dramatic reduction in the size of the US workforce because the “baby boomers” retiring over the next decade will be millions more than the number of new young workers entering the workforce.

Obviously this demographic fact of life affects all sectors -- from stock brokers to teachers, from retail sales people to health care workers, and certainly includes manufacturing. Thus the current and near-future outlook for graduates of technical training programs is excellent even as the reality of increasing productivity continues to reduce the number of traditional manufacturing jobs just as happened in agriculture the previous century. Data from a number of industries already show shortages of technicians with the necessary qualifications. For example, the National Association of Manufacturers (NAM) *2005 Skills Gap* survey said that “over 80% of respondents stated they face, right now, shortages of qualified employees including skilled production employees, scientists and engineers.” This will only get worse as the demographics play out.

Faced with the current and growing shortage of qualified technicians, many companies, their associations, and educational institutions are all taking multiple and collaborative steps to attract more students to careers as “skilled technicians” required for both engineering and production work in the 21<sup>st</sup> century. For example, successful companies must pay higher wages and benefits for many of these positions to attract the scarce talent they need to effectively utilize their production technologies and to continue to increase their productivity and competitiveness. They are also increasing their training efforts, utilizing skill standards and certifications to assure that the people they hire and train have the necessary skills, and improving their retention practices. All of this leads to more students seeing the advantages of “skilled technician” careers with companies that care about them as skilled individuals.

Perhaps most importantly, companies are realizing that they cannot solve this problem by themselves or just by complaining to educational and training entities. They are increasingly partnering with community colleges to guide their tech-prep programs to address the required skill upgrades, and working through their associations to attract more students to careers as skilled technicians and skilled production workers.

One significant example of this is the *Dream It Do It* program of the NAM Manufacturing Institute's Center for Work Force Success. This program aims at raising the perception of manufacturing careers among current and potential students. It is a regional approach to "Manufacturing Careers Campaign(s) ... providing youth-oriented awareness and education initiatives designed to captivate and prepare the next generation of skilled American manufacturing talent."

Another example is their *Business Champions* program to encourage manufacturing executives "to engage the business community, elected officials, foundation leaders and state policymakers to learn more about community colleges including their strengths and challenges in developing a skilled workforce." With "45% of all undergraduate students enrolled in community colleges", this program recognizes the necessity for business to partner with those institutions to advise them on what is required to prepare students for the more demanding jobs of the future.

The necessary skills needed by even production workers today include the knowledge derived from STEM education. With this knowledge they can more effectively use the automation, IT, and advanced production techniques so essential to US manufacturing competitiveness. This can be seen in the Advanced Manufacturing Competency Model developed by the Department of Labor (DOL) with help from NACFAM, the National Association of Manufacturers (NAM), the National Institute for Metalworking Standards (NIMS), the Society of Manufacturing Engineers, et al. The foundation for the Competency Model is derived from research done by the Manufacturing Skill Standards Council (MSSC) as part of a project co-managed by NACFAM and the American Federation of Labor's Working for America Institute. Key elements of the Model include STEM skills, collaboration, problem identification, communication, team and various other skills requirements for production workers and first line supervisors in the MSSC and other skill standards mentioned above.

Expanding on the latter two examples, and adding others:

- Advanced Manufacturing Competency Model (DOL)
  - Led by industry and government
  - Tied to existing manufacturing standards, including:  
AWS (welding), NIMS (metalworking), MSSC, etc.
  - Used to describe needed competencies and as one basis for DOL grants
- Manufacturing Skill Standards Council (MSSC)
  - Led by industry and labor, with input from education and government

- Focused on production workers and first-line supervisors
- Covers all manufacturing industries
- Validated standards, assessments, certification process
- Uses textbook and curriculum to prepare workers for testing
  
- Career Cluster Initiative (Department of Education – DOE)
  - Led by industry, education and government including the states
  - Aimed at providing career paths for all sectors and curriculum for them
  - NACFAM leads the Advanced Manufacturing effort in this initiative
  
- STEM Talent Development Regional Conferences
  - Led by MEP centers so far, with NACFAM assistance and national perspective
  - With industry, labor, education, government in a regional economic area
  - For example, Philadelphia regional conference
    - 170 attendees paid fees to attend
    - Determined what needed to be done by whom and with whom at regional, state and national levels
    - Within two weeks of the event set up a “Regional Compact” to drive action in detail
    - Conducted the project without taxpayer money!

These examples only scratch the surface, but they show there is great progress being made. Nevertheless, the challenges are even greater.

As daunting as the workforce issues are, they are only one of many challenges facing US manufacturers. Based on NACFAM’s research with a number of companies in various industries, the biggest trend in the future shape of manufacturing is toward “network-centric manufacturing”; that is, OEMs are increasingly becoming assemblers or integrators. They purchase systems, subsystems and components not only manufactured, but increasingly also engineered, developed, and often invented by their supply chain; i.e., by the “network”.

This requires significantly more capability throughout the supply chain, including over 300,000 smaller manufacturers (SMMs). These SMMs face the same challenges as the OEMs, but without the resources of big companies to cope with them. This puts significant strain on the smaller companies and on the infrastructure supporting them. It is especially critical in Defense procurement because the large defense OEMs are in many cases dependent on SMMs for mission critical components and/or systems.

This new paradigm requires “intense collaboration” among people and among organizations including not only OEMs and their suppliers (often smaller SMMs), but also in many cases with education and government entities. It also requires better “connectivity” for the exchange of data and information to improve real time performance for global competitiveness.



Concerning the infrastructure, these increasing requirements for especially SMMs demand more efficient and effective alignment of federal government programs with the real needs of those extended enterprises; i.e., the “networks”. Also required is more alignment of programs across federal agencies, not only for economic efficiency, but also because SMMs simply do not have the resources to sort out which programs will help solve their problems. Thus, another requirement is easier access to the multiplicity of government programs so they can do the job they were intended to do for SMMs.

Advanced manufacturing “*intense collaboration*” means OEMs and their suppliers, often SMMs, must work together among themselves, and with government, labor, educators, and others in the community to address problems industry cannot handle on its own. Chief among such problems is the issue of *increasing skill levels in American manufacturing workers*, the subject of this hearing. NACFAM’s role is often to broker the required “*intense collaboration*” among the different sectors of industry, labor, education and government because it has members in most of these sectors.

Business implications of “*network-centric manufacturing*”:

- For OEMs and SMMs, competitiveness comes from:
  - Innovation -- new technologies, products, processes
  - Faster times to market with the resulting products
  - The help of the entire network including skilled employees, educators and government at all levels
- This requires robust capabilities at all manufacturing tiers in:
  - Innovative product and process design and development
  - Supply chain collaboration and connectivity
  - Increasingly in corporate citizenship, including sustainability, green manufacturing, etc.
  - Creative labor-market policies for the above needs

Worker implications of “*network-centric manufacturing*”:

- Because of the demands on businesses, workers of the future at all levels must be enabled to work in a more “*network-centric*” way with:
  - More skills in science, technology, engineering & math (STEM)
  - Collaboration skills for teamwork, inside and outside of their companies
  - Creativity, analytic and problem solving skills for greater innovation in product and process
  - Continuous updating of all these skills to be:
    - The best they can be for their current positions and employers
    - Easily mobile to other jobs in new industries

To respond to these needs educators must:

- Collaborate with industry to understand its needs, both current and future

- Collaborate with government to innovatively optimize the return on public dollars they spend

#### Government implications:

- In today's constrained budget environment, focus must be not only on funding levels (input), but more importantly return on public dollars (output), e.g., for:
  - R&D -- new industries and jobs from new technologies, products and processes we cannot imagine today, just as in past decades we could not imagine much of what we take for granted today
  - Workforce investment, including economies of use with regional & economic development activities
- Government at best will take time to achieve its strategy for US manufacturing; at worst it will not get much done

#### What progressive companies must do:

- Manufacturers must hedge by doing all they can for themselves and their employees, including more creatively:
  - Recruiting new workers, both entering and displaced
  - Retaining existing workers through empowerment to accomplish meaningful goals, competitive compensation policies, and trust that they truly want to contribute
  - Training incumbent workers to continuously upgrade their skills as well as experience
  - Utilizing employees past their traditional retirement age
  - Leveraging foreign labor without losing US competitiveness
  - Companies that succeed in all of this will prosper

All of this suggests that metrics for strengthening US manufacturing should be:

- Not just how many manufacturing jobs there are, although this is obviously:
  - Critical to the people involved, but it measures only input
  - Especially with a shrinking workforce, output is also essential
- Similarly, % of GDP is misleading; for example:
  - New components of GDP (telecom, homeland security, disaster reconstruction, etc.)
  - Mean lower % of GDP for manufacturing even if absolute manufacturing output grows, as it has
- More important is the manufacturing output increase from:
  - Unimaginable new industries with new jobs as a result of R&D, both public and private

- Automation, Lean, 6-Sigma, Just-in-Time, etc.

Because we all want to help the American worker, government needs to creatively:

- Encourage and enable workers to continuously learn to:
  - Prepare themselves to be the best they can be today, and
  - Be ready for new jobs not now imagined
- Not just try to preserve old jobs, but rather:
- Devise innovative ways to minimize unemployment
- Creatively mitigate inevitable short-term displacements in a growing economy; e.g., worker retraining, health care assistance, transferable pensions, etc.
- Make its policies and programs for manufacturing the most competitive and accessible, vis-à-vis other countries

Key points to leave with you today:

- Leadership is essential in today's "flat world"
- Importance of output rather than only input
  - In everything we do, whether for our company or our country
- Trend to "*network-centric manufacturing*" demands:
  - "*Intense collaboration*" and connectivity among business, labor, education and government
  - Innovation especially in labor-market policies such as:
    - Greater recognition of the criticality of skilled production workers and technicians to American economic prosperity
    - More recognition of and support for the important role of community colleges in educating those workers and technicians
    - Encouragement and support for lifelong learning to both workers and employers
    - Policies for health care, pensions, etc. that recognize the realities of the 21<sup>st</sup> century concerning multiple jobs and employers over the span of almost everybody's working lifetime

# **Eric Mittelstadt**

## **Chief Executive Officer, National Council for Advanced Manufacturing (NACFAM)**

Eric Mittelstadt since January 2005 is the Chief Executive Officer of the National Council for Advanced Manufacturing (NACFAM), a leading industry think-tank based in Washington, DC focused on advancing policies to help make U.S.-based manufacturers more productive and globally competitive.

Mr. Mittelstadt is also chairman emeritus of FANUC Robotics America, the leading robotics company in the USA since 1984, and named one of "Michigan's 11 best companies to work for" in 1999. He headed that organization from its startup as a joint venture between General Motors Corporation and FANUC LTD of Japan in 1982, first as president & chief executive officer through August, 1997, and then as chairman & CEO through December 1998, leading it to \$370 million in revenue. Before that, his GM positions included managing director in Uruguay, product planning director in both Germany and Chevrolet, and engineering and management positions at GM engineering staff.

Separately, Mr. Mittelstadt heads his own firm, Mittelstadt Associates, Inc., specializing in top management strategy and implementation consulting, especially concerning customer and employee satisfaction, team building and financial performance. He is a past member of the board of Ellison Technologies, Inc., a leading machine tool distributor and, through its Automated Concepts, Inc. subsidiary, a long time successful integrator of robotic systems for various industries.

Born in Detroit, Mr. Mittelstadt received a BME from General Motors Institute (now Kettering University) in 1958, an MBA from Wayne State University in 1965, and completed the Tuck Executive Program at Dartmouth College in 1980.

Mr. Mittelstadt has served a number of volunteer organizations. He is a past Chairman of the NACFAM Board, and has been a member of the Board and chair of its Advanced Manufacturing Leadership Forum (AMLF). He has been a member of the Board of Directors of the Manufacturing Skill Standards Council (MSSC).

Mr. Mittelstadt is listed in Who's Who in Manufacturing and Who's Who in Entrepreneurs. In 1992 he won the Joseph F. Engelberger Award for Robotic Industry Leadership. He is past chair of the USA Robotics Industries Association (RIA), the International Federation of Robotics (IFR), the Board of Control of Michigan Technological University, the Board of Trustees of St. Luke's Episcopal Health Ministries, and the South Oakland County Chamber of Commerce. He is a past member of the Detroit Regional Chamber of Commerce Board of Directors, the Oakland County Executive's Business Roundtable, Bloomfield Hills City Planning Commission, Cranbrook Schools Board of Governors, the Vestry of Christ Church Cranbrook, and past president and member of the board of the Bloomfield Open Hunt.

Mr. Mittelstadt resides in Davidson, North Carolina with his wife, Susanne, a retired freelance writer and professional volunteer. The Mittelstadt's have seven children and fourteen grandchildren.